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(54) VIDEO SIGNAL PROCESSING UNIT

(57)Abstract:
PURPOSE: To display an image of a full mode as a shape represented by an original image when the image is displayed on a television receiver whose aspect ratio is 4:3 having no aspect conversion function and the image is transmitted.
CONSTITUTION: A video signal reproduced from a video disk 1 is subject to aspect ratio conversion processing at an aspect ratio converter 3 depending on a video ID detected by a video ID decoder 4 and a setting content of an aspect ratio conversion changeover button 6 and outputted through a switch SW 1. Then the video ID is rewritten depending on the aspect ratio conversion processing by a video ID encoder 7 and added to a video signal after aspect ratio conversion at a synthesizer 8.

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CLAIMS

[Claim(s)]

[Claim 1] the video signal processor characterized by to have a means change the aspect ratio of a means distinguish the recognition signal added to the video signal, a means set up the existence of aspect conversion, and a said recognition signal which distinguished and the image which said video signal forms based on the existence of the set-up aspect conversion, the means which rewrite said recognition signal according to the result of this aspect conversion, and a means add this rewriting **** recognition signal to the video signal after aspect transform processing.

[Claim 2] A video signal processor including the information which chooses some [horizontal] area of a big image whose recognition signals are aspect ratios according to claim 1.

[Claim 3] A video signal processor including the information which chooses some area of the perpendicular direction of a small image whose recognition signal is an aspect ratio according to claim 1.

[Claim 4] Horizontal and the video signal processor including the information which chooses some vertical enlarged display area according to claim 1 of the big image whose recognition signal is an aspect ratio.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the video signal processor which changes the aspect ratio of an image according to the recognition signal added to the

video signal, and setting actuation of ASUPETOKU conversion.
[0002]
[Description of the Prior Art] In recent years, the television receiver (the television set or monitoring device with which "4:3 television" and an aspect ratio were equipped [the television set with which an aspect ratio be equipped with "4:3 screen" and 4:3 screens for the screen of 4:3 below, or the monitoring device] with the "wide screen" and the wide screen for the larger screen than 4:3 is called "wide television") with which a bigger aspect ratio, for example, the same aspect ratio as a Hi-Vision receiver, than 4:3 which is the aspect ratio of the screen of the television set of the usual NTSC system displays images, such as the present NTSC system, on the screen of 16:9 is commercialized. Since the aspect ratio of a wide screen is close to the aspect ratio (vista size =1:1.66-1.85, SHINESUKO size = 1:2.35) of the wide screen of a movie theater, for example, if the video software of a movie is reproduced and it displays on the whole screen, it can appreciate an image with presence.
[0003] when an image with a larger aspect ratio than 4:3 (henceforth a "wide image"), for example, an aspect ratio, transmits the wide image of 16:9 with NTSC system etc. conventionally (record/playback is included), it is shown in drawing 16 (a) and (b) -- as -- for example, the about 480 scanning lines -- the blank was formed up and down and the number of scanning lines of an effective image was made about into 360. If this is called letter box format and this is expressed as 4:3 television, as shown in drawing 16 (c), the image at the time of transmission will be displayed as it is. On the other hand, if an aspect ratio displays with the wide television of 16:9, the effective image except an up-and-down blank will be displayed on the whole screen. In this case, the vertical number of scanning lines is about (it is about 480 when interpolation processing is performed) 360. In addition, since the width of face of the blank formed at the time of transmission becomes still larger when a subject-copy image is the SHINESUKO size of an aspect ratio 1:2.35, the active scanning line per frame of a transmission image decreases further.
[0004] On the other hand, when an aspect ratio displays the image which transmitted the image (henceforth "4:3 image") of 4:3 with a wide television, as shown in drawing 17 (d), about 360 are started from the effective scanning lines of 4:3 images, and an enlarged display is carried out to the whole screen. For this reason, the image of a wide television becomes what lacked some subject-copy images shown in drawing 17 (a). Or as shown in drawing 17 (e), a blank is formed in the both ends of a transmission image, and the whole subject-copy image is displayed.
[0005]
[Problem(s) to be Solved by the Invention] However, by the transmission approach of said conventional wide image, in order to transmit a subject-copy image in a letter box format, only about 360 vertical active scanning lines per frame cannot be found, and there was a trouble that resolution was low. Even if it made the number of scanning lines increase to about 480 by interpolation processing even if, the same

vertical definition about as 480 of a subject-copy image was not able to be obtained.
[0006] Then, it considers transmitting the image in the full mode of a wide image in which a blank is not prepared up and down, like drawing 18 . In this case, the image transmitted turns into a longwise image compressed into right and left as shown in drawing 18 (b). and although a subject-copy image is displayed in a configuration as it is as shown in drawing 18 (d) when this is displayed on a wide television, 4:3 television shows to drawing 18 (c) -- as -- a transmission image -- trouble ****** of becoming a longwise image as it is.
[0007] Moreover, as shown in conventional drawing 17 (d), when 4:3 images were displayed with a wide television and there was image information important for the lack part of a subject-copy image, there was a trouble of it becoming impossible for a viewer to grasp the contents of this image source correctly.
[0008] This invention is made in view of such a trouble, and while it transmits the image in the full mode of a wide image which does not form a blank up and down, when displaying this image on 4:3 television which is not equipped with the aspect conversion function, it aims at offering the video signal processor it enabled it to display in the configuration of a subject-copy image.
[0009] Moreover, this invention aims at offering the video signal processor which enabled it to display the area specified while enabling it to specify the area to display at the time of transmission, when some subject-copy images are not displayed from the difference with the aspect ratio of a subject-copy image, and the aspect ratio of a display image.
[0010]
[Means for Solving the Problem] In order to solve said trouble, the video signal processor concerning this invention A means to distinguish the recognition signal added to the video signal, and a means to set up the existence of aspect conversion, A means to change the aspect ratio of the distinguished recognition signal and the image which a video signal forms based on the existence of the set-up aspect conversion, It is characterized by having the means which rewrites said recognition signal according to the result of aspect conversion, and a means to add the rewritten recognition signal to the video signal after aspect transform processing.
[0011] Here, there are what includes the information which chooses some [horizontal] area of the big image of a ** aspect ratio, for example as a recognition signal, a thing including the information which chooses some area of the perpendicular direction of the small image of an aspect ratio, horizontal, a thing including the information which chooses some vertical enlarged display area of the big image of an aspect ratio, etc.
[0012]
[Function] While aspect conversion is performed according to the recognition signal in the video signal inputted, and the existence of the set-up aspect conversion according to this invention, a recognition signal is rewritten according to the result,

and it is added to the video signal after aspect conversion.
[0013] And some [horizontal] area of the big image of an aspect ratio, the area of a part of perpendicular direction of the small image of an aspect ratio, or the area of a part of horizontal and the perpendicular direction of the big image of an aspect ratio is chosen, and an aspect ratio is changed.
[0014]
[Example] Hereafter, it explains to a detail in order of the video ID for specifying the specification method (2) display position of the detail (1) display position of the detail [3] video ID of the video signal regenerative-apparatus [2] aspect conversion which applied [1] this invention, referring to a drawing about the example of this invention.
[0015] [1] Video signal regenerative-apparatus drawing 1 which applied this invention is the example which applied the video signal processor of this invention to the video signal regenerative apparatus. This video signal regenerative apparatus can play the videodisk on which the image source (henceforth "4:3 image source") of 4:3 is recorded [the aspect ratio] for the image source (henceforth the "full mode image source") or the aspect ratio in full mode of 16:9. The video ID which identifies the aspect ratio and image display format (the letter box, Normal) of the image source is added to predetermined Rhine of the perpendicular blanking period of the video signal of this image source. Furthermore, the video ID which discriminates an image display format from an aspect ratio is time sharing, and the video ID which identifies the information which is not related to aspect conversion actuation of the genre of the image source, a category, copy limit information, etc. is added. And this video signal regenerative apparatus performs transform processing of an aspect ratio, and rewriting processing of Video ID according to the existence of the aspect ratio conversion which the aspect ratio and user of the image source set up.
[0016] In drawing 1 , the video signal reproduced from the videodisk 1 is amplified with the playback amplifier 2, and is inputted into Terminal N, the aspect transducer 3, and the video ID decoder 4 of a switch SW1.
[0017] Actuation is related with a microcomputer 3 and a switch SW1 and the aspect converter 3 are controlled. That is, when not changing an aspect ratio, the N side of a switch SW1 is chosen, and when changing an aspect ratio, the W side of a switch SW1 is chosen.
[0018] Whether an aspect ratio is changed or it does not carry out carry out comparison contrast of the aspect ratio of the image source with which the user is recorded on the videodisk 1, and the aspect ratio of the screen of a television set (not shown), and it is determined by setting up the aspect conversion switch carbon button 6.
[0019] Since it is not necessary to change an aspect ratio when specifically displaying the case where (1) full mode image source is displayed on a wide television, and (2) 4:3 image source on 4:3 television, naturally it does not change. On the other hand, in displaying the case where (3) full mode image source is displayed on 4:3 television,

and (4) 4:3 image source on a wide television, it changes an aspect ratio. In addition, if the television set is equipped with the conversion function of an aspect ratio (the wide television is usually equipped with this function), it is not necessary to necessarily change an aspect ratio in a video signal regenerative apparatus.

[0020] A microcomputer 5 sends the data for creating the video ID which identifies the aspect ratio after conversion to the video ID encoder 7 while it looks at the video ID which the video ID decoder 4 decoded and sets up the mode of operation of the aspect transducer 3. The video ID which the video ID encoder 7 created is compounded in the synthetic vessel 8 at the perpendicular blanking period of a video signal. The flow chart of actuation of the microcomputer 5 explained above becomes like drawing 2 .

[0021] Here, the reason for rewriting the aspect ratio of Video ID is for making it not incorrect-recognize it as that from which the aspect ratio is not changed, when the television set connected to this BITEO signal regeneration equipment is equipped with the aspect conversion function. Moreover, it is for transmitting about the identification information (there being image transcription time etc. besides the above mentioned genre and the above mentioned copy limit code, when the image source is a tape) which is not related to aspect conversion actuation, without losing the information on original.

[0022] [2] The detail drawing 3 of aspect conversion is a block diagram showing one example of the configuration for performing rewriting of aspect conversion and Video ID.

[0023] The inputted video signal is divided into a Y signal and C signal by the Y/C separation circuit 11 in this drawing. And a Y signal is sent to A/D converter 12 as it is, and is changed into a digital signal, and C signal is decoded by the color-difference signal of U and V in the chroma decoder 13, and is sent to A/D converter 14 by time sharing.

[0024] As shown in drawing 4 , the Y signal sent to A/D converter 12 is sampled at the rate of 910 samples per 1 horizontal-scanning period, and is written in the Rhine memory 15. Similarly, U and V signal which were sent to A/D converter 14 are also sampled by turns at the rate of 455 samples per 1 horizontal-scanning period, and are written at a time in the Rhine memory 16 455 samples. This is sampling generally called 4:2:2.

[0025] The data written in the Rhine memory 15 and 16 are read according to the translation mode of an ASUPETOKU ratio. As mentioned above, the case where the image source in full mode is displayed on 4:3 television, and the case where the image source in full mode is displayed on 4:3 television here although an aspect ratio is changed when an ASUPETOKU ratio displays the image source of 4:3 on a wide television are explained.

[0026] It constituted from this example so that the part of the horizontal arbitration of the full mode image source could be chosen and displayed. The display image at

the time of choosing the (a) left end, the center of (b), and the (c) right end was shown in drawing 5 . Here, it is written in Video ID which part of the longitudinal direction of the full mode image source is chosen. For example, when the important image information of a certain scene is in the left end of a screen, the video ID for choosing a left end is written in. It becomes possible to make an intention of the copyright person of the full mode image source by this reflect in the image displayed on 4:3 television.

[0027] Read-out from the Rhine memory 15 and 16 is performed based on the read-out address signal which the read-out address-generation circuit 20 creates. The read-out address-generation circuit 20 operates according to the output of the video ID decoder 19. For example, if the decoded video ID chooses the left end of an image, the read-out address signal shown in drawing 6 (a) will be created. Moreover, if the center of an image is chosen and the right end of drawing 6 (b) and an image is chosen, the read-out address signal shown in drawing 6 (c) will be created. That is, about a Y signal, since it expands to the 4/3 time as many horizontal chisel of an image as this at the time of aspect conversion, since it is 910x3 / 4= 682.5, 682 samples are read. Similarly, about U and V signal, 341 samples are read respectively.

[0028] And the luminance-signal data of 682 samples which did in this way and were read from the Rhine memory 15 are changed into the luminance-signal data of 910 samples in the luminance-signal interpolation circuit 21. Moreover, it is changed into U which was read from the Rhine memory 16 and U of 341 samples and whose V signal data are 455 samples respectively in the U/V signal interpolation circuit 22, and V signal data.

[0029] An example of the interpolation processing in an interpolation circuit is shown in drawing 7 . Thus, three samples of the data D read from the Rhine memory are changed into four samples of the interpolation data H. In this drawing, H4 n=D3n, It is interpolating with the relational expression of H4n+1=(1/4) D3n+(3/4) D3n+1, H4n+2=(1/2) D3n+1+(1/2) D3n+2, and H4n+3=(3/4) D3n+2+(1/4) D3 (n+1).

[0030] Thus, the interpolated data of Y, U, and V are changed into an analog signal by D/A converters 23 and 24, respectively. And the video ID which the video encoder 26 created to the Y signal is compounded by predetermined Rhine of the perpendicular blanking period of a video signal in the synthetic vessel 25. Moreover, U and V signal are changed into C signal by the chroma encoder 28. And these Y signals and C signals are compounded with the synthetic vessel 27, and are outputted as a composite video signal.

[0031] Consequently, since the video signal outputted is changed into the aspect ratio of 4:3, one image of drawing 5 (a) – (c) chosen according to the original video ID is expressed as 4:3 television which inputted this video signal.

[0032] The aspect ratio conversion actuation in the case of displaying the full mode image source on 4:3 television above was explained. On the contrary, in displaying the 4:3 image source with a wide television, it chooses a part of perpendicular direction of

an image like drawing 17 , and it expands by 4/3 time to a perpendicular direction and a horizontal direction. For this reason, the field memory for expanding perpendicularly to an aspect converter and a vertical interpolation circuit are further needed.
[0033] [3] Explain the video ID required for the detail of Video ID, next conversion of an aspect ratio which was explained until now.
[0034] (1) Specification method drawing 8 of a display position shows how to specify the horizontal selected position of the image in the case of displaying the full mode image source on 4:3 television. Thus, a horizontal location shows the distance from a screen right end with the value of 4 bits of 0-15. For example, in the case of 7 or 8, and drawing 5 (c), it is set to 15 when this value is 0 and drawing 5 (b) in the case of drawing 5 (a).
[0035] Similarly, drawing 9 shows the selected position of the perpendicular direction in the case of displaying the 4:3 image source on a wide television. In this case, the vertical location shows the distance from screen upper limit with the value of 4 bits of 0-15.
[0036] Furthermore, drawing 10 shows horizontal and the tab-control-specification approach in the case of expanding perpendicularly and displaying on 4:3 television for the location of the arbitration of the full mode image source. It is the starting position of the horizontal direction and perpendicular direction of enlarged display area X0 It is the die length of the horizontal direction and perpendicular direction of Y0 and enlarged display area X1 Y1 It expresses.
[0037] (2) Video ID drawing 11 for specifying a display position is a recognition signal used by this example, is inserted in 20H and 283H of a perpendicular blanking period, and consists of 20-bit data following a reference signal and it. A reference signal shows that this wave is a recognition signal, and consists of triplets of "010." Moreover, data consist of 14 bits identification code and a 6-bit CRC code.
[0038] Drawing 12 shows the example of allotment of the 14-bit identification code in the recognition signal of drawing 11 . 14-bit identification code consists of WORD 2 of 1 or 8 bits of WORD of 0 or 4 bits of 2-bit WORD, as shown in (a) of this drawing. WORD 0 shows the transmission format and image display format of a video signal, as shown in (b) of this drawing. Incidentally, if drawing 16 (b), drawing 17 (b), and drawing 18 (b) are expressed by this WORD 0, it will be set to 01, 00, and 10, respectively. WORD 1 is a header which specifies the information transmitted by WORD 2, and, in the case of video-signal accompanying information like the video ID of this example, is set to 0100.
[0039] Drawing 13 shows the example of allotment of the information which specifies the horizontal location explained by drawing 8 and drawing 9 , and a vertical location. WORD 1 is 0100 which indicates that the header of video-signal accompanying information mentioned above. And 4 bits of low order of WORD 2 are data which identify the horizontal location shown in drawing 8 , and 4 bits of high orders of WORD 2 are data which identify the location of the perpendicularly it was shown in drawing

9 .
[0040] Drawing 14 shows another example of allotment of the information which specifies a horizontal location and a vertical location. In this example, the information from which a horizontal direction and a perpendicular direction discriminate a left end, a center, or a right end is assigned.
[0041] Drawing 15 shows the example of allotment of the information which specifies the enlarged display area shown in drawing 10 . In this case, horizontal information (X0 and X1) and the information on vertical (Y0 and Y1) are sent within one frame, and the bit 7 is used as a field discernment bit.
[0042] the case where the videodisk on which the full mode image source is recorded is displayed on 4:3 television which is not equipped with the aspect conversion function in the video signal regenerative apparatus of this example as explained to the detail above -- not a longwise image like before but a subject-copy image -- the image of a configuration as it is can be displayed. In this case, although some area of a subject-copy image is chosen and displayed, an intention of the copyright person of the image source can be made to reflect by adding to a video signal by using area to choose as Video ID.
[0043] In addition, although the system which deals with the image source with which the aspect ratio recorded the wide image of 16:9 was explained, as for said example, an aspect ratio can apply this invention also to the system which deals with the image source which recorded the image of still larger SHINESUKO size.
[0044] Moreover, although said example illustrated the player which plays a videodisk as a video signal listing device, of course, this invention can also be applied to the reversion system of a video tape recorder.
[0045]
[Effect of the Invention] As explained to the detail above, while transmitting the image in the full mode of a wide image which does not form a blank up and down, when displaying this image on 4:3 television which is not equipped with the aspect conversion function, according to this invention, it can display in the configuration of a subject-copy image.
[0046] Moreover, since the area which chooses a subject-copy image at the time of aspect conversion can be specified at the time of transmission of a bidet signal according to this invention, an intention of the implementer of the image source can be made to be able to reflect in the image after conversion, and, as a result, a viewer can grasp the contents of the image correctly.
[0047] Furthermore, according to this invention, since a recognition signal is rewritten at the time of aspect ratio conversion, even if it is the case where the television set which has an aspect conversion function is connected to the video signal processor concerning this invention, it is not incorrect-recognized as that by which aspect conversion of the television set is not carried out.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the video signal regenerative apparatus which applied this invention.

[Drawing 2] It is the flow chart which shows actuation of the video signal regenerative apparatus which applied this invention.

[Drawing 3] It is the block diagram showing an example of the configuration for performing rewriting of aspect conversion and Video ID in this invention.

[Drawing 4] It is drawing showing the sampling action of the A/D converter of drawing 3 .

[Drawing 5] It is drawing showing the horizontal selection area of the image in the case of displaying the full mode image source on 4:3 television.

[Drawing 6] It is drawing showing the writing / read-out address of the memory according to the horizontal selection area of drawing 5 .

[Drawing 7] It is drawing showing an example of interpolation processing.

[Drawing 8] It is drawing showing how to specify the horizontal selection area of the image in the case of displaying the full mode image source on 4:3 television.

[Drawing 9] It is drawing showing the selected position of the perpendicular direction in the case of displaying the 4:3 image source on a wide television.

[Drawing 10] They are horizontal and drawing showing the tab-control-specification approach in the case of expanding perpendicularly and displaying on 4:3 television about the location of the arbitration of the full mode image source.

[Drawing 11] It is drawing showing the configuration of the recognition signal used by this example.

[Drawing 12] It is drawing showing the example of allotment of the 14-bit identification code in the recognition signal of drawing 11 .

[Drawing 13] It is drawing showing the example which assigns the information which specifies a horizontal location and a vertical location using the identification code of drawing 12 .

[Drawing 14] It is drawing showing other examples which assign the information which specifies a horizontal location and a vertical location using the identification code of drawing 12 .

[Drawing 15] It is drawing showing the example which assigns the information which specifies enlarged display area using the identification code of drawing 12 .

[Drawing 16] It is drawing showing the image in the case of transmitting a wide image in the conventional letter box format, and displaying on 4:3 television or a wide

television.

[Drawing 17] It is drawing showing the image in the case of transmitting 4:3 conventional images and displaying on 4:3 television or a wide television.

[Drawing 18] It is drawing showing the image in the case of transmitting the conventional full mode image source and displaying on 4:3 television or a wide television.

[Description of Notations]

3 [-- An aspect ratio conversion switch carbon button 7 / -- A video ID encoder, 8 / -- Synthetic circuit] -- An aspect transducer, 4 -- A video ID decoder, 5 -- A microcomputer, 6